# Appendix E. Evaluation of Micrositing Options and Alternative Routes

*This appendix has been compiled based on information from the Application for Site Certification (ASC) (OPL 1998).*

## PIPELINE MICROSITING OPTIONS

The ASC map atlas prepared in February 1996 presented a proposed centerline based on known issues at that time. Since then, a number of route changes within the proposed corridor were made by OPL based upon findings from additional field studies and after consultations with federal, state, and local agencies and property owners. Micrositing refers to specific alignment changes made along the proposed centerline. Some of the changes and alternatives that were considered for the placement of the centerline are described below by approximate mile post increments. Micrositing of the pipeline will continue to occur to avoid problems or minimize impacts, with further consultation with landowners and agencies. Thus, not all changes in the route as a result of micrositing are presented below.

The criteria used for evaluating optional centerline locations included:

- Preference for use of existing cleared rights-of-way, including transmission line corridors, trails, and roadways.
- Avoidance of high quality wetlands or wildlife habitat.
- Minimizing impacts at stream crossings by the use of existing bridges.
- Minimizing impacts at stream or river crossings by using the narrowest feasible crossing points.
- Avoidance of land use impacts, such as to existing structures, irrigated crop lands, gardens, orchards, and golf course fairways.
- Considering landowner preferences as to line location.

### MP 0 - 3.3

West of Maltby Road, there is an existing wetland. The alternatives to avoiding this wetland would have caused impacts to residential structures in Halo Estates. A route selection was made both to avoid the residential area and to trench through slightly less of the wetland area.

The wetland at Little Bear Creek would be crossed by the pipeline. There were no alternatives to route placement due to topography and the desire to stay within the existing BPA transmission line corridor. A decision was made in 1997 to cross the wetland using a horizontal directional drill to avoid direct impacts to the wetland; however, OPL revised that decision and decided to open cut with diversion because of the environmental damage that would be caused in order to clear space for the horizontal directional drill on both sides of the wetland and creek.

East of State Route 9, the proposed centerline was moved from the south side of the BPA right-of-way to the north side to minimize wetland impacts.

Between station 137.5 and 147.5 the route was moved to the north side of the powerline to accommodate the landowner's development.

### MP 3.03 - 5.97

Between station 230 and 237, the centerline was moved to the north side of the corridor to minimize wetland impacts.

### Echo Lake Road Wetlands (MP 4.5)

The preferred corridor is within the BPA right-of-way. The initial route crossed from the south side of the BPA right-of-way to the north side to avoid residences adjacent to the south side of the right-of-way. While the route avoided the homes, the route would have crossed an open water portion of a wetland. After a more thorough investigation, OPL decided to maintain the proposed corridor on the south side of the BPA right-of-way within a dirt access road, and then to cross to the north side of the right-of-way to avoid the homes. The proposed corridor avoids the more sensitive open water portion of the wetlands, but it is anticipated that there would still be some impacts to less sensitive portions of the wetland from construction of the pipeline.

The route then crosses the Echo Lake Golf Course. The centerline was rerouted to follow the existing golf cart path to minimize impacts to the golf course and to avoid wetlands.

### MP 5.97 - 8.90

Near Welch Road, between about station 320 and 326, the centerline was moved slightly to accommodate the landowner's desires.

At about station 410, there were three alternatives to crossing the Snoqualmie River: to use the new Snohomish County Snoqualmie River Bridge, to dredge across the river, or to drill across the river. The preferred crossing method was to use the bridge, provided that there would be room in the utility corridor under the bridge at the time this project was permitted. The revised route would cross two small low-value wetlands on the west side. The bridge crossing would avoid drilling or dredging through the river and avoid construction staging in floodplains.

### MP 8.90 - 14

At station 557 near Peoples Creek, the centerline was rerouted from the north side of the corridor to the south side to minimize impacts to the creek. At station 596, the centerline was rerouted outside of the BPA corridor to use an existing road and to cross the creek at a location where it is already in a culvert.

Between stations 683 and 694, the centerline was rerouted onto an existing road to avoid a wetland. At the King County line at station 725, the centerline was rerouted to the west to accommodate the landowner. There were no wetland impacts caused by the reroute.

### North Road Wetlands (MP 12.8 to 13.0)

The initially-considered corridor and the preferred pipeline corridor are within the BPA corridor. The initial route would have crossed through a large wetland and open-water area extending across the right-of-way. The first alternative to crossing this wetland/open-water area was to go around it on the west side through private roads. Further investigation of this route concluded that there would still be potential impacts to wetlands and numerous residential yards. It was determined that a route around the east side of the wetland/open-water area was more feasible with fewer impacts to the wetland and residential properties.

### MP 11.58 - 20.64

Between station 822 and 837, the centerline was moved from the east side of the BPA corridor to minimize impacts to wetlands. Between station 873 and 877, the centerline was rerouted to the east to decrease wetland impacts.

### MP 20.64 - 25.19

At the Tolt River, the centerline was moved farther to the west to cross the mainstem through the riprap along the northern, or right, bank, in an area that was previously disturbed. The route was also revised to avoid a newly-constructed house.

### MP 25.19 - 30.40

At Griffin Creek, the centerline was moved west of the BPA corridor to avoid a mature spruce tree.

### MP 30.40 - 39.02

At Tokul Creek, the line was relocated to intersect Tokul Road north of the creek and crossed it on the bridge. The line lies longitudinally in Tokul Road, SE 53rd Way, and 396th Avenue SE until it joins an old railroad corridor north of Renig Road and follows it to the southeast side of North Bend. By using the abandoned railroad bed, mature trees were avoided.

### Tokul Creek (MP 30.6 to MP 32.9)

Crossing of Tokul Creek created significant engineering difficulties due to the extremely steep slopes. The original route selected crossed Tokul Creek further to the east, and would have required clearing a construction corridor through approximately 0.5 miles of forested area. The initial route would have also impacted some wetland areas, and would have required a significant drop and rise in elevation. Two other potential routes were investigated, but both had similar constraints. After discussions with the commercial property owner, it was decided that the route following Falls Station Road (396th) would be more environmentally suitable.

### MP 39.02 - 41.38

There were two alternative routings in this area, one using Edgewick Road. Edgewick Road is a heavily traveled two-lane paved road. During construction the road would have to be closed to through traffic; therefore, a route was selected to avoid the roadway impacts and to avoid the adjacent Category 1 forested wetland. The route at station 2115 was moved to the south to avoid Boxley Creek. At station 2155, the centerline was moved to accommodate the landowner and moved slightly onto Twin Falls State Park land.

### Edgewick Road Wetlands (MP 38.6 To MP 41.2)

This area has numerous wetlands and small ponds. Many alternative routes were investigated to cross this area to reach the John Wayne Trail. The selected corridor had the least impacts of the routes investigated.

### MP 41.38 - 47.44

At stations 2303 and 2314, the route was moved to the south side of the streams to improve constructability.

### MP 47.44 - 53.50

In the vicinity of Alice Creek and Tinkham Road, the route was located to maximize the use of the road and previously disturbed areas, and to avoid impacts to the recreational trail. The centerline was also moved to avoid potential spotted owl habitat.

### MP 53.50 - 66.57

At station 2860 to 2900, the centerline was moved from the John Wayne Trail to an abandoned railroad siding to minimize recreational impacts to trail users and to use previously disturbed lands. The centerline was also moved to use the narrowest crossing points for Humpback and Olallie Creeks to minimize impacts to the creek.

### MP 66.57 - 69.60

At approximately MP 68, the centerline was rerouted around the existing tunnel due to limited construction space within the tunnel.

### MP 69.60 - 72.54

At Cabin Creek (station 3820), consideration was given to using the existing bridge. The bridge was found to be unusable for the pipeline, and the centerline was rerouted to use a Puget Sound Energy maintenance road. The road was elevated away from most of the wetlands. This route would minimize wetland impacts and avoid mature trees.

### MP 72.54 - 75.47

At station 3845, the centerline was routed onto Monahan Road to access the Puget Sound Energy transmission line corridor. At station 3935, the centerline was rerouted around a wetland that was found in the powerline corridor.

### MP 75.47 - 78.41

At station 4057 - 4077, the centerline was realigned to cross the concrete-lined canal at a $90^{o}$ angle. From station 4113 - 4120, the centerline was moved onto an existing road to avoid a wetland.

### MP 78.41 - 81.25

At Big Bear Creek (MP 79), the centerline was moved to the west to accommodate a landowner. At Little Creek (station 4250 - 4058), the centerline was moved to the east to minimize impacts to the creek.

### MP 81.25 - 82.95

At MP 82, there were two alternative alignments. One alignment would be in a spotted owl circle. An agreement was reached with a nearby landowner to cross onto the landowner's property to avoid the spotted owl circle.

### MP 82.95 - 91.87

Between station 4382 - 4417, he centerline was moved to the north onto the powerline corridor to avoid a spotted owl circle, and then to the south edge of the BPA corridor to avoid wetlands. At station 4435 - 4445, the centerline was moved to the north onto an existing road to avoid a wetland. At station 4467 - 4478, the centerline was moved to the south to use an existing road and culvert crossing to avoid wetlands and Spex Art Creek.

### MP 91.87 - 94.79

At station 5000, the route would cross the Yakima River. The centerline was moved to the north at the river crossing to avoid cottonwood trees. Consideration was given to building a bridge across the river at this location to extend the John Wayne Trail and to provide access to the Wallace Ranch, but a decision was made not to construct a bridge because of engineering constraints and costs. The alternative is under discussion with both State Parks and the landowner.

### MP 94.79 - 106.91

At station 5097 - 5210, the centerline was moved off of the powerline to avoid wetlands, oak woodlands, and talus slope areas.

### Swauk Creek (MP 97.5)

The preferred route followed the BPA corridor. Several important habitat features were identified in this area and the routes were further constrained by the Swauk Creek Canyon, which had very steep slopes with rock outcroppings. Field investigations determined that a more southerly route down the canyon slopes and then northerly back up the eastern side of the canyon was the most

feasible and would avoid impacts to the oak woodland habitat features. Although the preferred corridor passed through small areas of oak woodland, no oak trees would be removed.

### MP 106.91 - 108.90

From station 5675 - 5742, the centerline was moved to the north and east to minimize impacts to wetlands and Currier Creek.

### Ellensburg (MP 105.5 to MP 119)

The initial route would have brought the pipeline closer to Ellensburg with a terminal and pump station constructed on the northeast side of the Ellensburg Airport. Further investigation of this route and site for the terminal identified a number of issues: a significant number of wetlands would have been impacted; traffic patterns to the proposed terminal were difficult; and the pipeline would have been constructed on the John Wayne Trail through the City of Ellensburg. To avoid these impacts, the preferred corridor was significantly rerouted to traverse further north of Ellensburg, and the proposed terminal site was moved to near Kittitas. The preferred corridor minimized the wetland impacts and improved truck access to the terminal.

### MP 108.90 - 115.91

From about MP 109 to MP 115, the centerline was relocated to the property lines to accommodate the landowners and to accommodate future development of the land.

### MP 115.91 - 121.88

From station 6245, where the pipeline crossed under the Kittitas Highway, to station 6320, the centerline was moved to the west and south to accommodate the landowner. At station 6350 - 6410 the line was moved to the north to parallel the John Wayne Trail to avoid a sewage lagoon. The route then followed an existing road to the south to the Kittitas Terminal.

### MP 121.88 - 124.91

From station 6444 - 6565, the centerline was moved off of the John Wayne Trail to parallel I-90 to accommodate landowner concerns. The realignment decreased impacts to private irrigation canals and lessened impacts on farming.

### MP 124.91 - 127.94

From station 6572 to 6610, the centerline was moved to the north to avoid a gravel pit. Use of the railroad right-of-way was considered as an alternative route, but it was found to be too narrow to accommodate construction. From station 6727 - 6755, the centerline was also moved to the north to improve constructability.

### MP 127.94 - 146.02

See Chapters 2 and 3 of the EIS for discussion of the options for crossing the Yakima Training Center, owned by the U.S. Department of the Army, or avoiding the training center by routing the pipeline north of I-90.

At Johnson Creek, the original route was moved further to the west to minimize wetland impacts.

### MP 146.02 - 156.53

See Chapters 2 and 3 of the EIS for discussion of the options for crossing the Columbia River.

### MP 156.53 - 161.46

Between station 8270 and 8365, two alternative routes were considered. The shortest route would traverse the land diagonally. The alternative route required that the pipeline go due north for 1 mile before turning east. The longer route was selected because there would be fewer wetland impacts.

### MP 161.46 - 170.45

Between station 8605 - 8657, the centerline was moved farther to the north to avoid wetlands and at the landowner's request (Quack, Inc.) to avoid duck hunting areas. Between stations 8700 - 8810, the centerline was rerouted to follow a section line and moved to the north paralleling a railroad line to avoid wetlands that were important to waterfowl.

### MP 170.45 - 173.30

At station 9147, the centerline was moved to the north side of State Route 26 to avoid the Columbia National Wildlife Refuge and wetlands.

### MP 173.30 - 188.92

The original route crossed the toe and eastern portion of the Corfu Landslide area of the Saddle Mountains. An alternative was developed to parallel State Route 26 to Danielson Road. This alternative route would avoid the Corfu Landslide area, be shorter in length, and decrease wetland impacts by approximately 1.5 acres. At MP 182, the route would be located within the existing county road right-of-way.

### Saddle Mountain (MP 177.7 to MP 184)

The initial corridor followed a transmission line that was approximately midslope on the Saddle Mountains (elevation approximately 1,300 feet). The geologic review indicated that this route traversed geologic formations similar to what was identified as the Corfu Landslide (MP 175 to MP 178). Although the Corfu Landslide is historic, it was decided to relocate the pipeline corridor to the toe of the slope along Kuhn Road to avoid crossing the potential landslide area.

### MP 188.92 - 196.88

The proposed route in this location would run through a wetland. Alternatives were explored to avoid the wetland, but the route was constrained on the east by an existing irrigation circle. The irrigation pivot has electrical lines throughout the field and drainage tiles.

### MP 196.88 - 202.94

At station 10455 - 10500, the centerline was zigzagged to minimize impacts to the Eagle Lakes wetlands. At station 10635 - 10645, the centerline was moved further east of Glade North Road to avoid a wetland and to cross the abandoned railroad bed at a $90^{o}$ angle.

### MP 202.94 - 205.97

At station 10735 - 10822, the centerline was moved to the east side of the right-of-way to improve constructability and to accommodate the landowner.

### MP 205.97 - 208.99

At station 10945, the centerline was moved to the east side of Glade North Road to avoid an asparagus field and to accommodate landowner concerns.

### MP 208.99 - 217.99

At station 11095, the centerline was moved to the edge of an irrigation sprinkler circle, which was not there at the time the route was originally planned. The relocated centerline then followed the property line.

### MP 217.99 - 227.27

At stations 11614 - 11627, the centerline was moved to the south at Esquatzel Coulee to cross the coulee at a right angle and to avoid conflicts with the powerline.

### MP 227.27 - 230.09

At station 12130, the centerline was rerouted to the north to follow an existing road into the Pasco Delivery Facility.

## ALTERNATIVE PIPELINE ROUTE EVALUATION

### Siting Criteria

A number of alternative pipeline routes were considered, including alternative origin points, alternative destination points, and alternative routes that would connect the desired origin and destination points. There are no federal, state, or industry criteria to be used in route selection for a petroleum product pipeline, but there are accepted practices within the pipeline industry. The following six criteria were used in evaluating route alternatives:

- # length of pipeline as a cost factor for both construction and operation;
- # elevation profile;
- # constructability;
- # pipeline access;
- # environmental impacts; and
- # ownership/land use.

A preliminary review of environmental impacts and pipeline access was conducted based on an aerial review by helicopter. If a route alternative was eliminated based on one of the first four criteria, it was considered either not buildable or not operable from a cost viewpoint. In those cases, a review of environmental impacts and ownership/land use impacts was not performed.

***Pipeline Length.*** The cost of construction and operation of a pipeline is dependent upon its length. Increasing the length of a pipeline route directly increases the amount of materials and labor that must be utilized. There may also be a need to add more pump stations or to increase the diameter of the pipe in order to compensate for the additional frictional losses. Each of these items

adds to the pipeline's construction cost. If the size of the pipe is not enlarged, the increased length would result in the consumption of larger amounts of electric energy as a result of additional frictional losses. This adds to the pipeline's operation costs. The estimated effects of these elements are as follows:

- The estimated construction cost for a mile of pipeline is approximately $460,000.
- The estimated construction cost of each pump station is approximately $2 million.
- Enlarging the pipeline by one standard diameter costs approximately $32,000 per mile.
- Increasing the length while holding the diameter constant costs approximately $36,000 per mile-year.
- The estimated construction cost per additional river crossing is approximately $1 million.

***Elevation Profile.*** The cost of construction and operation is also dependent upon the elevation profile of the route. Increasing the total elevation gain of a route or increasing the number of elevation gains and losses all result in an increase in the length of a pipeline's route and often cause an increase in the number of pump stations required, increasing the construction cost. High points and sudden elevation losses near the end of pipeline segments create the need to maintain higher-than-normal back pressures. This results in the consumption of larger amounts of electric energy and higher operating costs.

***Constructability.*** Constructability refers to the engineering difficulty and construction costs relative to the topography and geology (soils) of a route. Steep and rugged terrain is more difficult to work with when engineering a pipeline, and costs of construction are significantly higher than constructing on more level terrain. The routes are also reviewed to identify any significant obstacles to construction. Large rock outcroppings, narrow right-of-way, water bodies, and steep slopes are among the construction obstacles that can add significant costs and present impassable or difficult barriers.

Areas that needed special construction techniques were also a consideration. Such areas included extensive construction through rock, water crossings including irrigation systems, agricultural fields that have drainage systems, narrow rights-of-way, and steep slopes.

Routes were analyzed using the following subcriteria:

- Did the route include steep and rugged terrain that would present an impassable or difficult barrier to construction equipment and personnel?
- Did the route include large rock outcroppings that would be a barrier to construction?
- Did the route include narrow right-of-way that would not provide adequate space for construction equipment and materials?

- # Did the route cross major water bodies that would require specialized construction techniques?

***Pipeline Access.*** Petroleum pipelines are designed to be in use for decades. When choosing right-of-way, prime consideration is given to pipeline access for maintenance activities. The pipeline corridor is chosen so that access to the line is very easy at valve and pump station locations and easy at all other points. Routes were analyzed using the following subcriteria:

- # Did public roadways exist near the pipeline corridor?

- # In an emergency situation, could emergency response personnel reach the pipeline from a public roadway within 1 hour?

- # Did public roadways exist near the valve and pump station locations?

- # Can access be gained to the sites from the nearest public roadways?

***Environmental Impacts.*** Alternative routes are reviewed on a preliminary basis for significant environmental impacts and significant environmental impacts were avoided to the greatest extent possible. Consideration was given to wetlands, stream crossings, sensitive plant and animal species, and important habitats. Although many of the environmental resource impacts could not be avoided, the overall impact could be minimized. Selecting a route that included a high percentage of existing right-of-way could also minimize the overall significance of the impact to the environment. To minimize the disturbance of existing habitats and land uses, routes that would use existing cleared or disturbed rights-of-way were preferred. Routes were analyzed using the following subcriteria:

- # How many miles of existing cleared or disturbed rights-of-way would the alternative route use?

- # How many miles of new right-of-way would have to be cleared?

- # How many major water crossings would be crossed by each alternative route?

- # Did the alternative route cross any known highly sensitive plant and animal habitats?

Three planning principles were used to minimize or avoid environmental impacts. The first planning principle was to utilize areas that had been impacted previously and to avoid areas that have not been impacted previously. Previously impacted areas included:

- # Rights-of-way for roads, rail-trails, electric power transmission lines, and other pipelines which were appropriate and otherwise compatible with the proposed pipeline.

- # Parcels on which the plant communities and other features of the landscape had been significantly altered by logging, grazing, or cultivation.

The second planning principle was to avoid sensitive/critical areas to the maximum feasible extent. These areas included:

- # old growth forest;
- # priority plant and animal habitat;
- # sub-alpine and alpine habitat;
- # lakes
- # streams
- # wetlands
- # highly erodible/unstable slopes; and
- # historically/culturally significant sites.

Avoidance of impacts to these features occurred primarily by physically avoiding contact with the feature and any associated buffers.

The third planning principle was to minimize impacts to sensitive/critical areas when avoidance of those areas was not possible. Large wetlands or streams that extended across the width of the route were examples of aquatic features in this category.

- # Where wetlands or streams could not be avoided, an alignment was selected that routed the pipeline through the narrowest and/or least sensitive portion of the feature.

Further impact reduction would be accomplished during construction by:

- # narrowing the width of the construction corridor;

- # minimizing riparian tree removal;

- # having construction equipment work from beyond the boundary of the feature where feasible and from equipment mats elsewhere;

- # using erosion/sediment control devices; and

- # undertaking rapid stabilization and revegetation of disturbed areas.

In reviewing proposed water crossings, two questions were asked of each crossing location and proposed method:

- # Were there practicable alternative locations for the pipeline alignment that would result in less impact to the aquatic ecosystem?

- # Were there practicable alternative construction techniques that could be utilized at a given crossing location that would result in less impact to the aquatic ecosystem?

In general, because streams are long linear features, it was not possible for a pipeline alignment to avoid crossing them. The following subcriteria define the issues of concern with respect to stream crossings:

- Was there a nearby practicable location for the stream crossing that would result in decreased impacts to the streambed or riparian zone?

- Was there a nearby practicable location for the stream crossing that would result in decreased potential for erosion, sedimentation, or water quality degradation?

- Was there a nearby practicable location for the stream crossing that would enable a construction method to be used with fewer environmental impacts?

In contrast, wetlands tend to occupy a defined space with identifiable boundaries. It was theoretically possible for a pipeline to entirely avoid wetlands and the regulations require that to be done unless it could be demonstrated that it was not practicable to do so. The following subcriteria defined the issues of concern with respect to wetland crossings:

- Could the pipeline alignment be moved slightly (i.e., into an upland) to avoid the special aquatic site?

- If an upland alignment was available, had it been previously impacted?

- If an upland alignment was available, would its use result in the loss of any priority habitat or other sensitive habitat

- If an upland alignment was available, would its use result in indirect impacts to special aquatic sites such as loss of buffers, destabilization of adjacent banks/slopes, modification of hydrology, or degradation of water quality?

- If an upland alignment was available, would its use bring the pipeline alignment into proximity with structures used for residential, industrial, or public assembly purposes?

- If an upland was available, would its use result in the alignment being unacceptably close to other structures such as the base of electric transmission towers/poles, buried power or communication cables, or other buried utility lines such as those used to transport water, sewer, natural gas, and crude/refined petroleum?

- If an upland was available, would its use result in the alignment being in an area that was subject to disturbance by others performing routine construction/maintenance activities on roads or other utility facilities?

- If an upland was available, would its use result in the alignment being in an area that was likely to necessitate a relocation of the pipeline in the future?

- # Was there a nearby location that would result in less total impact on special aquatic sites, taking into account size, plant community, and functions?

***Ownership/Land Use.*** The overall cost and time to acquire rights-of-way for a proposed pipeline are significant considerations. Constructing a pipeline through highly developed areas is expensive and there are often significant landowner issues that have to be considered. Although these areas often cannot be avoided, construction through highly developed areas can be minimized by careful selection of a route. Minimizing the total number of landowners that are affected reduces the number of easements that have to be negotiated and the overall cost of the project. Selecting a route that traverses grazing and/or unproductive land, utilizing existing corridors, and using large tracts of land that are under single ownership are factors in evaluating potential routes. Routes were analyzed using the following subcriteria:

- # Did the proposed route cross through populated areas?

- # Did the proposed route cross through land in which the use of a pipeline would conflict with adjacent existing land uses?

- # Would the proposed route cause the long-term loss of agricultural land?

## Alternative Routes Evaluated

Based on an operating scenario of constructing a new product pipeline to Pasco, Washington, a number of alternative pipeline routes were identified following the three central mountain passes in Washington:

- # Stevens Pass;
- # Snoqualmie Pass; and
- # Stampede Pass.

Maps of these mountain passes were reviewed to identify any existing road or utility corridors that could potentially be used for a pipeline. The alternative mountain pass routes which were considered, based on the Pasco Terminus Alternative, were:

- # Allen Station via Stevens Pass to Pasco

- # Snohomish via Stevens Pass to Pasco

- # Thrashers Corner via Snoqualmie Pass to Pasco

- # Thrashers Corner via abandoned railroad route (Centennial Trail) and Snoqualmie Pass to Pasco

- Hollywood via the Tolt Pipeline Corridor and Snoqualmie Pass to Pasco

- Renton Station via Stampede Pass to Pasco

In addition, there was one variation through the Yakima Valley to Pasco that could use any of the three mountain pass routes. The six route alternatives and one sub-alternative are described below and compared in Table E-1.

***Allen Station Alternative via Stevens Pass.*** The Allen Station Alternative route would take advantage of the point where the two existing product lines first come together at the Allen Pump Station approximately 2.5 miles west of Burlington, Washington. From this point, a new pipeline would be constructed in the existing right-of-way to a point approximately 4 miles south of Everett where the existing pipelines cross the Burlington Northern Railroad (BNRR) tracks. At this point, a new pump station would be constructed and the route would turn east and parallel the BNRR right-of-way through the communities of Monroe, Sultan, and Gold Bar. Because the BNRR right-of-way narrows near the community of Index, the pipeline route would enter the BPA powerline right-of-way which also parallels U.S. Highway 2 to a point approximately 5 miles east of the Stevens Pass summit. At this location, the route would follow the old BNRR right-of-way to the abandoned Old Cascade Tunnel under Stevens Pass.

The route, after exiting the east portal of the Old Cascade Tunnel, would generally follow U.S. Highway 2 and BPA powerlines easterly approximately 24 miles to Chumstick Creek in the Wenatchee National Forest. The route turns south and parallels Chumstick Creek and a county road for approximately 8 miles to Leavenworth. At Leavenworth, the route would again generally follow existing BPA powerlines southeasterly for approximately 39 miles passing north of Cashmere, crossing the Wenatchee River east of Monitor and going west of Wenatchee.

South of Wenatchee, the route would follow BPA powerlines that parallel the Columbia River. The route would cross the Columbia River south of Rock Island Dam where a BPA powerline crosses the Columbia River west of Moses Coulee. After crossing the Columbia River, the route would traverse southeasterly through the Columbia Basin Irrigation Project and intersect State Route 26 east of the community of Royal City. This alternative would parallel State Route 26 to a point approximately 4 miles west of Othello, then turn south following county roads to Pasco along the same route as the Thrasher to Pasco route.

- **Pipeline Length:** The approximate length of the pipeline would be 285 miles.

- **Elevation Profile:** Eight (8) pump stations would be required.

- **Constructability:** Routes using Stevens Pass were considered more rugged with more steep slopes and rock outcroppings, and therefore less "constructable" than routes using Snoqualmie Pass.

- **Pipeline Access:** The terrain was considered more "remote" than routes using Snoqualmie Pass, and therefore less accessible.

**Table E-1. Alternative Pipeline Route Evaluation Summary**

| Route | Pipeline Length (miles) and Cost (millions) | # of Pump Stations | Constructability | Pipeline Access | Environmental Impacts | Ownership/Land Use |
|---|---|---|---|---|---|---|
| Allen Station via Stevens Pass to Pasco | 285<br>$133.0 | 8 | less constructable than Snoqualmie Pass routes | difficult | 4 river crossings: Columbia, Snohomish, Skykomish (6 times), Wenatchee | 7 cities: Monroe, Sultan, Gold Bar, Index, Leavenworth, Cashmere, Wenatchee |
| Snohomish via Stevens Pass to Pasco | 240<br>$125.0 | 7 | less constructable than Snoqualmie Pass routes | difficult | 4 river crossings: Columbia, Snohomish, Skykomish (6 times), Wenatchee | 7 cities: Monroe, Sultan, Gold Bar, Index, Leavenworth, Cashmere, Wenatchee |
| Thrashers Corner via Snoqualmie Pass to Pasco | 230<br>$105.1 | 6 | more constructable than Stevens Pass routes | easy | 4 river crossings: Snoqualmie (4 times), Tolt, Columbia, Yakima | 3 cities: North Bend, Snoqualmie, Kittitas (North Bend and Snoqualmie on trail) |
| Thrashers Corner via abandoned railroad route (Centennial Trail) and Snoqualmie Pass to Pasco | 245<br>$115.0 | 6 | more constructable than Stevens Pass routes | moderate | 4 river crossings: Snoqualmie (4 times), Tolt, Columbia, Yakima; Significant wetland impacts along Centennial Trail | 7 cities: Duvall, Carnation, North Bend, Snoqualmie, Kittitas, Ellensburg, Beverly |
| Hollywood via the Tolt Pipeline Corridor and Snoqualmie Pass to Pasco | 225<br>$109.0 | 8 | more constructable than Stevens Pass routes | easy | 4 river crossings: Snoqualmie, Tolt, Columbia, Yakima | 3 cities: North Bend, Snoqualmie, Kittitas. Conflict with City of Seattle Tolt River Pipeline corridor |
| Renton Station via Stampede Pass to Pasco | 210 | 8 | less constructable than Snoqualmie Pass routes | moderate | 4 river crossings: Cedar, Green, Columbia, Yakima | Densely populated south King County. Conflict with Seattle Cedar River and Tacoma Green River watersheds |
| Yakima Valley | 240<br>$110.0 | 8 | constructable assuming paired with Snoqualmie Pass route | easy | 4 river crossings: Snoqualmie (4 times), Tolt, Columbia, Yakima (6 times). Construction impacts to vineyards, orchards, crops | 4 cities: Ellensburg, Yakima, Selah, Richland. Land use conflicts due to construction impacts to vineyards, orchards, crops |

- **Environmental Impacts:** There would be four major river crossings: Columbia, Snohomish, Skykomish, and Wenatchee Rivers, with at least six crossings of the Skykomish between Monroe and Index.

- **Ownership/Land Use:** Seven cities would be impacted: Monroe, Sultan, Gold Bar, Index, Leavenworth, Cashmere, and Wenatchee.

***Snohomish Alternative via Stevens Pass.*** An alternative to the Allen Station Alternative would be to tie into the two existing pipelines at the crossing of the BNRR right-of-way south of Everett. From this location, the route would be the same as the Allen Station Alternative.

- **Pipeline Length:** The approximate length of the pipeline would be 240 miles.

- **Elevation Profile:** Seven (7) pump stations would be required.

- **Constructability:** Routes using Stevens Pass were considered more rugged with more steep slopes and rock outcroppings, and therefore less "constructable" than routes using Snoqualmie Pass.

- **Pipeline Access:** The terrain was considered more "remote" than routes using Snoqualmie Pass, and therefore less accessible.

- **Environmental Impacts:** There would be four major river crossings: Columbia, Snohomish, Skykomish, and Wenatchee Rivers, with at least six crossings of the Skykomish between Monroe and Index.

- **Ownership/Land Use:** Seven cities would be impacted: Monroe, Sultan, Gold Bar, Index, Leavenworth, Cashmere, and Wenatchee.

***Thrashers Corner Alternative via Snoqualmie Pass.*** This is the proposed pipeline, as discussed in detail in Chapters 2 and 3 of the EIS and summarized below:

- **Pipeline Length:** The approximate length of the pipeline would be 230 miles.

- **Pipeline Hydraulics:** Six (6) pump stations would be required.

- **Constructability:** Routes using Snoqualmie Pass were considered less rugged than Stevens Pass routes with fewer steep slopes and rock outcroppings, and therefore more "constructable" than routes using Stevens Pass.

- **Pipeline Access:** The majority of the route follows existing roads, trails, and transmission line corridors. Where new right-of-way corridors would be needed, they were located near existing roads or utility corridors. Due to the proximity of I-90, the use of the Cedar Falls Trail and the John Wayne Trail, and many existing county and private roads, the route was considered very accessible.

- **Environmental Impacts:** Approximately 109 miles of the route would be in existing cleared rights-of-way. These would limit the need to disturb uncleared land and limit impacts on wetland and vegetation habitats. The route would cross 293 rivers, streams, or culverts; however 12 of these crossings would be on existing bridges and many of these crossings would be located above or below an existing culvert, or below an existing irrigation canal.

- **Ownership/Land Use:** Federal agencies own 25 miles of the route, state agencies own or control 30 miles, local agencies own or control 1.5 miles, and there are 175 miles in private ownership with many ownerships in large tracts. The pipeline would cross through three cities or towns (North Bend, Snoqualmie, and Kittitas), although the route through North Bend and Snoqualmie would be on the existing Cedar Falls Trail and would not require new right-of-way to be developed.

***Thrashers Corner Alternative via the Centennial Trail and Snoqualmie Pass.*** This alternative would use the Centennial Trail (an abandoned railroad right-of-way) that follows the Snoqualmie River valley. This alternative would begin at Thrashers Corner and head east along the existing BPA powerline corridor. However, after crossing the Snoqualmie River, the alternative route would utilize the railroad right-of-way that generally parallels State Route 203 on the east side of the Snoqualmie River valley. The route would remain on the old railroad right-of-way over Snoqualmie Pass, the Columbia River, and to a point just east of Royal City where it would turn south to Pasco following the same route as described above for the Thrashers Corner to Pasco route.

- **Pipeline Length:** The approximate length of the pipeline would be 245 miles.

- **Elevation Profile:** Six (6) pump stations would be required.

- **Constructability:** The existing right-of-way in the Snoqualmie Valley is very narrow and would cause a considerable increase in the construction time due to the difficulties of moving labor and equipment in a confined space.

- **Pipeline Access:** The majority of the route would follow an abandoned railroad line. In some places, this route would parallel existing highways or roads. However in the vicinity of Snoqualmie Pass, the route would be farther from I-90 and other existing roads than the Thrashers Corner to Pasco route. It was therefore considered less accessible.

- **Environmental Impacts:** Approximately 115 miles of the route would be in existing cleared rights-of-ways. While this would generally limit the need to disturb uncleared land and limit impacts on wetland and vegetation habitats, there were a number of wetlands directly adjacent to the Centennial Trail. Due to the narrowness of the trail, it would be very difficult if not impossible to avoid temporary construction impacts to the wetlands. In addition, the trail bed would require widening to allow space for the pipeline in addition to the existing cable, and this widening would require filling of wetlands on one or both sides of the trail.

- **Ownership/Land Use:** Federal agencies own 10 miles of the route, state agencies own or control 33 miles, local agencies own or control 7 miles, and there are 87 miles in private ownership. The pipeline would cross through seven cities or towns (Duvall, Carnation, North Bend, Snoqualmie, Kittitas, Ellensburg, and Beverly), although the route through would be on the existing Centennial Trail and would not require development of new right-of-way.

***Hollywood-Tolt Pipeline Alternative via the Tolt Pipeline Corridor and Snoqualmie Pass.*** The Hollywood-Tolt Pipeline Alternative would originate near Hollywood in the Sammamish River valley and would head directly east following the right-of-way of the City of Seattle's Tolt River Waterline. This route would cross the Snoqualmie River south of Duvall and connect with the BPA powerline corridor north of Stillwater. At this point the route would follow the Thrasher-Pasco corridor over Snoqualmie Pass to Pasco.

Although this route is a cleared pipeline route and would have fewer direct landowner and environmental impacts, the City of Seattle has plans to develop an additional water pipeline within their corridor. Concerns have been expressed by the City of Seattle over placing a petroleum products pipeline in the same right-of-way as the water pipeline that supplies potable water to the City of Seattle.

- **Pipeline Length:** The approximate length of the pipeline would be 225 miles.

- **Elevation profile:** Eight (8) pump stations would be required.

- **Constructability:** Routes using Snoqualmie Pass were considered less rugged than Stevens Pass routes with fewer steep slopes and rock outcroppings, and therefore more "constructable" than routes using Stevens Pass.

- **Pipeline Access:** The majority of the route follows existing utility corridors, roads, trails, and transmission line corridors. Where new right-of-way corridors were needed, they were located near existing roads or utility corridors. Due to the proximity of I-90, the use of the Cedar Falls Trail and the John Wayne Trail, and many existing county and private roads, the route was considered very accessible.

- **Environmental Impacts:** Four rivers would be crossed: Snoqualmie, Tolt, Columbia, and Yakima.

- **Ownership/Land Use:** The Tolt River Pipeline corridor is owned by the City of Seattle, which has plans to place a second water pipeline in the corridor, eliminating space for a petroleum products pipeline.

***Renton Station Alternative via Stampede Pass.*** One route was considered over Stampede Pass, starting near I-405 and State Route 167 at the existing OPL Renton Station. The Renton Station, in addition to being a pump station, is also the main office and monitoring station for OPL. The route would go northeasterly out of the Renton Station to State Route 169 (Maple Valley Road). The route would use the existing powerline and railroad right-of-way and traverse

southeasterly paralleling State Route 169. Near 192nd Street the route would turn east, crossing State Route 18 just north of Hobart and connect with the BPA powerline corridor. The route would then generally follow the existing powerline right-of-way southeasterly past Howard Hanson Reservoir, then northeasterly ascending Stampede Pass. The route would then turn to the southeast and connect with the John Wayne Trail and follow the same route as the Thrasher-Pasco corridor.

- **Pipeline Length:** The approximate length of the pipeline would be 210 miles.

- **Elevation Profile:** Eight (8) pump stations would be required.

- **Constructability:** Routes using Stampede Pass were considered more rugged than Snoqualmie Pass routes with more steep slopes and rock outcroppings, and therefore less "constructable" than routes using Snoqualmie Pass.

- **Pipeline Access:** Because Stampede Pass was more remote in places, the access to the pipeline in mountainous areas was considered less accessible than routes over Snoqualmie Pass.

- **Environmental Impacts:** The route would pass through both the Cedar River and Green River watersheds. There were strict prohibitions on construction within watershed areas.

- **Ownership/Land Use:** The route would pass through more densely populated areas in south King County and was viewed to have greater ownership and land use impacts than routes using Snoqualmie Pass.

***Yakima Valley Alternative from Stevens, Snoqualmie, or Stampede Passes.*** An alternative route to Pasco was considered that would turn south near Ellensburg and go through the Yakima Valley. The Yakima Valley Alternative would have used any of the three alternative routes over Stevens Pass, Snoqualmie Pass, or Stampede Pass. East of Snoqualmie Pass, all of the considered routes would follow the existing BPA powerlines going south and east of Cle Elum. East of Cle Elum, where the powerline corridor crosses the Yakima River, the routes would also cross the John Wayne Trail. The Yakima Valley Alternative would follow the trail and cross over the Yakima River several times on existing railroad bridges. West of Ellensburg, the route would turn south, crossing the Yakima River several times, and would generally parallel the west side of the Yakima River.

Approximately 5 miles south of Ellensburg, the route would cross to the east side of the Yakima River and follow the railroad right-of-way. The corridor through the canyon would cross the Yakima River a minimum of five times north of Yakima, then the route would turn southeasterly and follow an existing BPA powerline right-of-way that is north of the Roza Canal. Near the Yakima/Benton County line and State Route 241, the route would turn south along an existing powerline corridor. Approximately 6 miles north of Grandview, the route would turn east and southeast crossing the Columbia River on the Interstate 182 bridge and going north of Pasco before turning south to the Pasco Delivery Facility.

- **Pipeline Length:** The approximate length of the pipeline would be 240 miles.

- **Pipeline Hydraulics:** Eight (8) pump stations would be required.

- **Constructability:** The Yakima Valley Alternative could use any of the three mountain pass routes. It was considered "less constructable" because it would have crossed the Yakima River a minimum of six times (at approximately $0.75 to 1 million for each crossing) and would have crossed irrigation canals 43 times, including 2 crossings each of the Sunnyside and Rosa Canals.

- **Pipeline Access:** With the Snoqualmie Pass crossing, this route would be as accessible as the proposed Thrasher to Pasco Alternative.

- **Environmental Impacts:** The route would cross the Yakima River a minimum of six times. The route would cross a number of vineyards, croplands, and orchards. The route would cross the Sunnyside and Rosa Irrigation Canals twice. The route would cross irrigation canals 43 times.

- **Ownership/Land Use:** The route would pass through the densely populated areas of Ellensburg, Yakima, Selah, and Richland. Construction impacts to vineyards, orchards, and croplands such as those used for growing asparagus would be significant.

## Summary of Route Alternatives

A comparison of the six route alternatives and one sub-alternative is shown in Table F-1.

The routes were compared first for pipeline length because the length adds significantly to both the construction and operation costs. The construction cost for the pipeline through generally level terrain is approximately $460,000 per mile. The Allen Station via Stevens Pass Alternative would be 45 to 60 miles longer than other routes and would therefore cost a minimum of between $20 and $28 million more to build than other routes. This route and the Snohomish Alternative would both go over Stevens Pass. Stevens Pass is much more rugged, with more steep slopes and more rock outcroppings than Snoqualmie Pass. These factors add to the construction difficulty, and would significantly increase construction costs and the time required for construction in mountainous areas. Both routes would also require going through seven cities with construction impacts to both residents and motorists on U.S. Highway 2. For these reasons, both the Allen Station and Snohomish Alternatives were eliminated from further consideration.

The Renton Station Alternative would use Stampede Pass, and would go through the City of Seattle's Cedar River watershed and the Green River watershed. Stampede Pass was judged to be less constructable than Snoqualmie Pass alternatives, the pipeline access would be more remote than Snoqualmie Pass alternatives, and it was unlikely that permission would be granted by the City of Seattle to construct within the Cedar River watershed. For these reasons, this alternative was eliminated from further consideration.

Three alternatives using Snoqualmie Pass were considered. One route using the Centennial Trail would be approximately 20 miles longer than the other two at an approximate increase of $10 million in construction costs. The Hollywood Alternative would require two additional pump stations, at a construction cost of approximately $4 million over the Thrashers Corner Alternative. Pipeline access would range from easy to moderate for all three alternatives. All three would have the same number of river crossings. A preliminary review of wetland impacts for the three alternatives showed that the alternative using the abandoned railroad line along the Centennial Trail would create the unavoidable impact of filling high quality wetlands. High quality wetlands could be avoided on the other two Snoqualmie Pass alternatives. The railroad alternative also would impact a greater number of cities than the other two Snoqualmie Pass alternatives. Due to the need to add fill to widen the Centennial Trail route, the resulting unavoidable impacts to wetlands, and the greater number of cities that would be affected during construction, the railroad alternative was eliminated from further consideration.

Of the two remaining Snoqualmie Pass alternatives, the Hollywood Alternative would place the proposed pipeline in the City of Seattle Tolt River Water Pipeline corridor. The city has initiated plans to add a second water pipeline within this corridor, and there would not be room for two water pipelines plus the refined petroleum products pipeline. Because this route would now require the clearing of new right-of-way, it was eliminated from further consideration.

The Yakima Valley Alternative could be used with any of the three mountain pass crossings. The environmental impacts were judged to be greater than the Thrashers Corner Alternative because the Yakima Valley Alternative would require crossing the Yakima River a minimum of six times as compared to one crossing for the Thrashers Corner Alternative. The increase in crossings would increase construction costs by approximately $5 million (river crossing costs are estimated at $1 million per crossing). The route would also cross through vineyards, orchards and crops such as asparagus. The Thrashers Corner Alternative would cross primarily through grazing land and would skirt irrigated fields. The Yakima Valley Alternative was judged to have a greater impact on land uses for this reason. The purchase cost of right-of-way easements from property owners was also estimated to be greater due to the impacts to vineyards, crop lands, and orchards. The construction impacts to these areas would take longer to recover than the brief impacts to open grazing land. For these reasons, the Yakima Valley Alternative was eliminated from further consideration.

The remaining alternative, Thrashers Corner via Snoqualmie Pass to Pasco, was found to be constructable and accessible. The alternative made extensive use of existing utility or road corridors to minimize the need to clear new right-of-way. The route avoids crossing through major populated areas, and crosses through two cities (Snoqualmie and North Bend) within an existing trail.